WHAT IS CLAIMED IS:

1. An apparatus for detecting a traffic lane mark for an automotive vehicle, comprising:

a photograph device to photograph a situation of a running road in a vehicular forward direction;

a traffic lane detection window setting section that once sets one traffic lane detection window on an image data photographed by the photograph device;

a window internal traffic lane detecting section that detects a traffic lane mark passing through the traffic lane detection window set by the traffic lane detection window setting section on the basis of a luminance information on each point within the traffic lane detection window, the window lane detection setting section setting a plurality of other traffic lane detection windows in accordance with the one traffic lane detection window through which the traffic lane mark is passed and the window internal traffic lane detecting section detecting the traffic lane mark passing through each of the other traffic lane detection windows set by the traffic lane detection window setting section on the basis of the luminance information on each point of the other traffic lane detection windows;

a noise detection window setting section that sets at least one noise detection window at a position which abuts each of the traffic lane detection windows set by the traffic lane detection window setting section;

an edge intensity detecting section that detects an edge intensity within each noise detection window set by the noise detection window setting section;

a weight value modifying section that modifies a weight value to each of the traffic lane detection windows

in accordance with the edge intensity in the related one of the noise detection windows; and

a road contour calculating section that calculates a road contour using any of the traffic lane marks detected by the window internal traffic lane detecting section and the weight value modified by the weight value modifying section.

2. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the noise detection window setting section sets at least one noise detection window at the position which abuts one of elongation ends of each traffic lane detection window.

3. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the noise detection window setting section sets a plurality of noise detection windows at the positions which abut both of elongation ends of each traffic lane detection window.

4. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the edge intensity detecting section detects an intensity of a lateral edge to each of the noise detection windows which is located near to a center of the running road with respect to the corresponding one of the traffic lane detection windows and detects an intensity of a longitudinal edge to each of the noise detection windows which is located at an outer side of the running road with respect thereto.

5. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the weight value modifying section reduces the weight value

for one of the traffic lane detection windows when the edge intensity detected in one of the noise detection windows which abuts the one traffic lane detection window is strong enough to be equal to or larger than a predetermined value.

6. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the weight value modifying section modifies the weight value to one of the traffic lane detection windows which abuts the corresponding one of the noise detection windows.

7. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the weight value modifying section reduces the weight value to at least one of the traffic lane detection windows which is located in the vehicular more forward direction than one of the noise detection windows which is located at a closer proximity to the vehicle and in which the edge intensity detected by the edge intensity detecting section which is equal to or larger than a predetermined value is detected.

8. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the weight value modifying section reduces the weight value to at least one of the traffic lane detection windows which is located in the vehicular more forward direction than one of the noise detection windows in which the edge intensity which is equal to or larger than the predetermined value is detected by the edge intensity detecting section and which is located at a center side of the running road and is placed at a closer proximity to the vehicle and wherein the weight value modifying section reduces the weight value

to one of the traffic lane detection windows which abuts the corresponding one of the noise detection windows which is located at an outer side of the running road with respect to the corresponding traffic lane detection window and in which the edge intensity which is equal to or larger than a predetermined value is detected.

9. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the weight value modifying section reduces the weight value to each one of the traffic lane detection windows which abuts each corresponding one of the noise detection windows when the edge intensity which is equal to or larger than a predetermined value continuously for a predetermined time or more is detected in the same noise detection window.

10. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 7, wherein the weight value modifying section clears results of detections of the traffic lane mark in one of the traffic lane detection windows which abuts the corresponding one of the noise detection windows in which the edge intensity which is equal to or larger than the predetermined value is detected and in the other of the traffic lane detection windows which is located at the vehicular more forward direction than the traffic lane detection window which abuts the corresponding noise detection window in which the edge intensity is equal or larger than the predetermined value.

11. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the window internal traffic lane detecting section detects the traffic lane mark in each traffic lane detection window

using a longitudinal edge detection filter as follows:

$$Idx(i, j) = I(i+1, j-1)/4 + I(i+1, j)/2 + I(i+1, j+1)/4 - I(i-1, j-1)/4 - I(i-1, j)/2 - I(i-1, j+1)/4,$$

wherein I(i, j) denotes a luminous intensity of a X Y coordinate point P(i, j) in the traffic lane detection window and Idx(i, j) denotes a longitudinal edge intensity value at the point (i, j), executes a Hough transform for all edge points which indicates numerical values of Idx(i, j) except zero, determines a first-order linear equation in a pole coordinate system passing through the one of the traffic lane detection windows set by the traffic lane detection window setting section which takes a maximum value hmax in pole coordinates $[\rho, \theta]$, determines a largest maximum value hmax which is larger than a threshold value TH0, and determines a straight line determined from the linear equation passing through the one traffic lane detection window to be the traffic lane mark from the maximum value hmax of the pole coordinate system.

12. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the edge intensity detecting section detects the edge intensity for each of the noise detection windows set by the noise detection window setting section using a lateral edge filter as follows:

$$Idy(i, j) = I(i-1, j-1)/4 + I(i, j-1)/2 + I(i+1, j-1)/4 - I(i-1, j+1)/4$$

- I(i, j + 1)/2

- I(i + 1, j + 1)/4 wherein I(i , j) denotes a luminous intensity of the coordinate point P(i, j) and Idy (i, j) denotes a lateral edge intensity value at the point P(i, j) and at the point P(i,j) where the value of Idy which indicates a numerical value expect zero is the presence of the lateral edge.

13. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 12, wherein the edge intensity detecting section detects the edge intensity for each of the noise detection windows which is located near to a center side of the running road with respect to the traffic lane detection window using the lateral edge filter.

14. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 13, wherein the edge intensity detecting section detects the edge intensity for each of the noise detection windows which is located at the outer side with respect to the corresponding traffic lane detection window using the longitudinal edge detection filter.

15. An apparatus for detecting a traffic lane mark for an automotive vehicle as claimed in claim 1, wherein the road contour detecting section executes a broken line approximation for the traffic lane mark from the straight lines of the traffic lane mark detected by the window internal traffic lane detecting section to calculate a contour of the photographed traffic lane and projects the broken line approximated traffic lane mark into a three-dimensional space to calculate the contour of the road in the vehicular

forward direction.

16. An apparatus for detecting a traffic lane mark for an automotive vehicle, comprising:

photographing means for photographing a situation of a running road in a vehicular forward direction;

traffic lane detection window setting means for setting one traffic lane detection window on an image data photographed by the photograph device;

window internal traffic lane detecting means for detecting a traffic lane mark passing through the traffic lane detection window set by the traffic lane detection window setting section on the basis of a luminance information on each point within the traffic lane detection window, the window lane detection setting means setting a plurality of other traffic lane detection windows in accordance with the one traffic lane detection window through which the traffic lane mark is passed and the window internal traffic lane detecting means detecting the traffic lane mark passing through each of the other traffic lane detection windows set by the traffic lane detection window setting means on the basis of the luminance information on each point of the other traffic lane detection windows;

noise detection window setting means for setting at least one noise detection window at a position which abuts each of the traffic lane detection windows set by the traffic lane detection window setting means;

edge intensity detecting means for detecting an edge intensity within each noise detection window set by the noise detection window setting means;

weight value modifying means for modifying a weight value to each of the traffic lane detection windows in accordance with the edge intensity in the related one of

the noise detection windows; and

road contour calculating means for calculating a road contour using any of the traffic lane marks detected by the window internal traffic lane detecting means and the weight value modified by the weight value modifying means.

17. A method for detecting a traffic lane mark for an automotive vehicle, comprising:

photographing a situation of a running road in a vehicular forward direction;

once setting a traffic lane detection window on an image data photographed by the photograph device;

detecting a traffic lane mark passing through the once set traffic lane detection window on the basis of a luminance information on each point within the once set traffic lane detection window;

setting a plurality of other traffic lane detection windows in accordance with the once set traffic lane detection window through which the traffic lane mark is passed;

detecting the traffic lane mark passing through each of the other traffic lane detection windows on the basis of the luminance information on each point of each corresponding other traffic detection windows;

setting at least one noise detection windows at a position which abuts each of the traffic lane detection windows;

detecting an edge intensity within each noise detection window;

modifying a weight value to each of the traffic lane detection windows in accordance with the edge intensity in the related one of the noise detection windows; and

calculating a road contour using any of the detected

traffic lane marks and the modified weight value.